

Archival Authenticity in a Digital Age

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Archival Authenticity: An Example

Downtown Baltimore is a vibrant, dynamic place filled with new office towers and hotels that rise above shops, plazas, and museums. At the heart of Baltimore is the Inner Harbor, an area that is crowded year-round with residents and tourists who are sightseeing, dining, shopping, or watching baseball at nearby Camden Yards. Over the past two decades, the Inner Harbor has become the living center of a revitalized downtown.

The defining feature of Baltimore's Inner Harbor, unlike that of so many American cities, is not a glass structure, a shining space needle, or a distinctive sculpture. The Harbor is marked instead by the sturdy masts and graceful spars of the USS *Constellation*, a historic wooden-hulled naval vessel permanently moored there.

The famous ship arrived in Baltimore in 1955, and for the next 35 years, the city celebrated its frigate, taking pride in the illustrious history of a ship that had been built in Baltimore in 1797 as a sister ship to the equally famous USS *Constitution* anchored in Boston. The story of the *Constellation* took a different turn in 1991, however, with the publication of *Fouled Anchors: The Constellation Question Answered*, a report by Dana Wegner, the chief of ship models at the U.S. Navy's David W. Taylor Research Center in Carderock, Maryland. Rumors had circulated for half a century that the *Constellation* was not what its promoters claimed it to be, and Wegner's report confirmed them. Investigators from the Navy discovered that the supposed Revolutionary War-era frigate in Baltimore Harbor was actu-

ally a Civil War era sloop that had been built in Norfolk, Virginia, in 1854. All it shared with the frigate built in Baltimore in the eighteenth century was its name. It resembled a Revolutionary War-era frigate because during early renovations, some of the ship's admirers had «restored» the *Constellation* to appear to be almost 60 years older than it was; for example, they added a second gun deck and made other alterations. For most of its tenure in Baltimore, the *Constellation* was living a lie (Wegner 1991; LeDuc 1999).

Many themes are at work in the story of the true identity of the *Constellation*. Early citizens of Baltimore, for example, seemed to have a stronger need to connect to the Revolutionary War than to the Civil War. They may have felt that «older is better», and that the ship would be of greatest interest if it was thought to have a Baltimore connection (i.e., if it had been built there). Nonetheless, their distortion of history came at the expense of the *Constellation's* very interesting own history. It was, for example, the last and largest all sail-powered sloop commissioned by the U.S. Navy, and while it did not engage in a famous sea battle, as did its predecessor, it did work to interdict the slave trade during the mid-1800s.

The most interesting themes in the *Constellation* story, however, revolve around the issue of authenticity—not the authenticity of the ship itself, but rather the authenticity of the *documentation* about the ship. For it was not just the appearance of the ship that was «forged», but also the written record concerning the ship.

Some of the changes to the written record may not have been an intentional effort at deceit. Between 1854 and 1908, for example, the annual reports of the Navy listed the ship as having been built in Norfolk in 1854; however, from 1909 onward, the reports listed the ship as having been built in Baltimore in 1797. Was this an intentional effort to deceive or an honest effort to correct what naval officers may have thought was a past mistake? Wegner could not determine the answer.

In the 1950s however, documents began to appear that Federal Bureau of Investigation (FBI) investigators later determined were forged. One document, allegedly written in 1918, was found to have been written with a typewriter made after 1946. Some of the forged documents in the possession of researchers bore forged stamps indicating that they were copies of records found in the National Archives. Other forged documents were inserted into historical files at the National Archives and at the Franklin Roosevelt Presidential Library, where they were subsequently «found» by researchers.

The need to alter the archival written record to conform to a particular historical interpretation speaks to the power of archives to

authenticate. At rest in Baltimore Harbor was a physical artifact, a wooden ship, measuring over 180 feet long and weighing several hundred tons. The existence of the artifact per se, however, was not enough to establish its authenticity. To confirm beyond doubt the nature and history of the *Constellation*, both supporters and critics of the «*Constellation* as frigate» theory turned to a few sheets of paper housed in a few archives.

What characteristics of traditional analog archives give them the power to authenticate? And how can this power be maintained in the digital world, both for archives and for other cultural heritage repositories in general?

The Nature of Archives

To understand why users turn to and trust information found in analog archives, it is necessary to understand the nature of archives. In the vernacular, the word *archives* has come to mean anything that is old or established, be it collections of old movies (such as the Pacific Film Archive), a journal that publishes what the editors hope will be papers of enduring value (for example *Virchows Archiv*, the official journal of the European Society of Pathology), or even rock-and-roll oldies on cable television (in the V Archives) (Maher 1997). Even information professionals have not been loath to extend the definition of archives beyond that found in the American Library Association (ALA) Glossary or other official lexicons when they speak of «digital archiving», a generic term for the preservation of electronic information.

While archivists often inherit responsibility for old things, a collection of historic documents or artifacts, in and of itself, does not make an archives. A true archives is a contextually based organic body of evidence, not a collection of miscellaneous information. A manual written by Dutch archivists almost a century ago codified existing German and French archival theory and developed a modern basis for archives. According to these authors, archives are «the whole of the written documents, drawings and printed matter, officially received or produced by an administrative body or one of its officials...» (Muller, Feith, and Fruin 1968). This definition has been adopted in one form or another by most of Western society.

Found within this definition are the essential elements that define an archives and are the source of much of its power to authenticate. First, archives consist of documents. For the Dutch, these documents

had to be written or printed; modern archivists extended the definition to include multimedia records, including sound recordings and motion pictures. More recently still, archivists (and the courts) have added electronic records to the definition of documents. A recent court case even argued (unsuccessfully) that «cookies», the small transactional files created by many Web browsers when surfing the Internet, were government records when found on a computer used by a government official; others have argued that voice-mail messages are documents (Welch 1998). In short, archives consist of documents, regardless of their form¹.

The documents constituting a formal archives are further distinguished by the fact that they have to have been officially produced or received by an administrative body. Such documents become records. According to the most recent glossary of archival terms, published by the Society of American Archivists, a record is a «document created or received and maintained by an agency, organization, or individual in pursuance of legal obligations or in the transaction of business» (Bellardo and Bellardo 1992). When someone requests a Social Security card, when a business reports its revenues for tax purposes, or when President Clinton issues a proclamation, documents are created. These documents are records because the agencies or officials involved in each transaction are fulfilling legal obligations as they conduct their business. Similarly, when a faculty committee approves tenure for an assistant professor, or when an organization issues an invitation to a meeting, a record is created.

Note that under this definition, the archivist is not concerned about the value, accuracy, or utility of the content of the record. A document may contain lies, errors, falsehoods, or oversights-but still be evidence of action by an agency. Nor does a record have to be particularly interesting or important, or even something that anyone would ever want to consult again. Pure archival interest in records depends not on their informational content, but on the *evidence* they provide of government or business activity. As the Australian archivist Glenda Acland has noted, the «pivot of archival science is evidence, not information» (Acland 1992).

For a time, the essence of records as evidence slipped from center of the archival vision. Ironically, the challenges inherent in dealing with the most modern of records-electronic records-forced creative

¹ Of course, the question of what constitutes a «document» can be problematic (Buckland 1997).

archivists to reinvestigate basic archival principles. Perhaps the most notable of these individuals is David Bearman, author of many publications on electronic records. His collection of essays on *Electronic Evidence: Strategies for Managing Records in Contemporary Organizations* is particularly noteworthy (Bearman 1994). Similar analysis has been conducted by the Australians Sue McKemmish, Frank Upward (McKemmish and Upward 1993), and Glenda Acland, and by the archival educators Luciana Duranti in Canada (Duranti 1998) and Margaret Hedstrom in the United States (Hedstrom 1995). All these authors have concluded to some extent that one can deal effectively with electronic records only if one returns to the first principles of archival theory, including the importance of records as evidence.

Records as evidence provide internal accountability for an agency and make it possible for the agency to determine what it has done in the past. More important, archives-when they contain records that can serve as evidence-can force leaders and institutions to be accountable for their actions. Government archives that contain evidence of the actions of the government can ensure that the rights of individual citizens are protected². They can also provide evidence of when, where, and why the Navy might build and name a new ship.

Records preserved as evidence may also be interesting because of their informational content. For example, census records retained in an archives because of the evidence they provide about the activity of the Census Bureau, may be of great interest to genealogists. To many archivists, however, the fact that the Census Bureau creates census returns in the course of conducting its legally mandated business-not the information contained in the record-is of paramount importance³.

At the heart of an archives, therefore, are records that are created by an agency or organization in the course of its business and that serve as evidence of the actions of that agency or organization. The agency or organization maintains those records for its business pur-

² These two themes-the ability of archives to hold public officials accountable and to protect the rights of individual citizens-form the basis of the new mission statement of the National Archives and Records Administration, i.e., «to ensure ready access to essential evidence [and note the emphasis on *evidence*] ... that documents the rights of American citizens, [and] the actions of federal officials ...

³ While most archivists would agree with the definition of a record as presented in this paper, there are strong differences about what criteria should be used in the appraisal of records for retention or possible destruction. Some archivists argue that only the evidentiary value of the records should be taken into account, others argue that sociocultural requirements, including the need to establish memory) should be considered (Cook 1997; Cox 1994; Cox 1996).

poses. At the point when the records are no longer of immediate value to the organization, it may elect to transfer its records to an archives. The archives become responsible for maintaining the evidentiary nature of the materials after the records have left the control of the agency that created them.

One way in which archivists working with analog records have sought to ensure the enduring value of archives as evidence is through the maintenance of an unbroken provenance for the records. Archivists need to be able to assert, often in court, that the records in their custody were actually created by the agency specified. Furthermore, the archivist must be able to assert that the records have been in the custody only of the agency or the archives. In an analog environment, the legal and physical transfer of the documents from the agency to the archives ensures an unbroken chain of custody.

Archives truly exist only when there is an unbroken chain of custody from the creating agency to the archives. For a government archives, the transfer of custody is best accomplished as a matter of law. As Margaret Cross Norton, a pioneer theorist of American archives, noted:

We must disabuse ourselves of the concept that the acquisition by the state historical society of a few historical records ... automatically transforms the curator of manuscripts into an archivist ... An archives department is the government agency charged with the duty of planning and supervising the preservation of all those records of the business transactions of its government required by law or other legal implication to be preserved indefinitely (Mitchell 1975).

In a nongovernmental agency, policy can take the place of law if the policy identifies what records of business transactions need to be preserved indefinitely. Either law or policy, however, should govern the transfer of records to an archives.

Why is the authorized transfer of a complete set of records to an archives with an unbroken chain of custody important? First, it helps maintain the evidentiary value of the records. An archivist can be called upon to testify in court about the nature of the records in his or her custody. That archivist would not be expected to testify as to the accuracy of the contents of the records. However, he or she should be able to assert that on the day when the records left the custody of the originating agency or organization, a particular document was included as part of the records.

Equally important as unbroken custody in establishing the integrity of records is the completeness of the documents. Only records that are complete can ensure accountability and protect personal rights.

As soon as records become incomplete, their authority is called into question. For example, when information is missing in a record, we do not know if it is because the information was never created or because it has been discarded. Individual records must be complete; they must contain all the information they had when they were created. They must also maintain their original structure and context.

In addition to each individual record being complete, it is also necessary that the record series in which the record is created be complete. Because records gain meaning from their context, it is important to know the nature of other records. Take the example of a case file. A case file is a record relating to one person as he or she interacts with a government agency. It might be an application for food stamps, an assessment of eligibility for veterans' benefits, or a request for a reproduction of a photograph in an archives. By itself, a case file can tell the user a great deal, but it does not reveal whether the individual in question was treated differently from other people in the same situation. To understand a single record in context, one needs the whole series. There may be references from the case file to other records in the same series. Whenever possible, therefore, archivists seek to preserve entire series.

This does not mean that archivists never throw anything away. The normal archival principle is to save only 2 to 4 percent of an organization's records. What archivists try to avoid, however, is assessing individual records or parts of records. One either keeps the entire record or discards the entire record. Similarly, the normal presumption is that one either keeps or discards an entire series of similar records (though there may be times when the bulk of the records makes this impossible).

Hilary Jenkinson, a leading archival theoretician, neatly summed up the importance of both the legal basis for the transfer of records to an archives and the need for completeness within the record series and the individual records. He noted the importance of authenticity to archives and defined it as the principle that archives are «preserved in official custody ... and free from suspicion of having been tampered with» (Jenkinson 1965). According to Jenkinson, the archivist's primary task is «to hand on the documents as nearly as possible in the state in which he received them, without adding or taking away, physically or morally, anything: to preserve unviolated, without the possibility of suspicion, every element in them, every quality they possessed when they came to him» (Jenkinson 1984).

Archivists have a responsibility to ensure the integrity of the documents even after they are legally transferred to a repository. In an

analog environment, this is done by a number of mechanisms. Users of archives, for example, normally must work under the supervision of an archival staff member. The users are instructed to maintain the order of records as they are found and are cautioned against adding material to or removing it from the file. In some cases, especially when documents are known to be of great economic value, an archival staff member may count the documents delivered to and then returned by a researcher. (Normally, however, the volume of material in an archives works against any sort of item control.)

The example of the *Constellation* illustrates both the promise and the dangers associated with the evidentiary power of traditional archives. Some of the forged documents that seemingly proved that the ship in the Baltimore harbor had been built in 1797 were found among the records of the U.S. Navy located in the National Archives and Records Administration. Transfer of the records presumably took place under the legal authority of the Federal Records Act, and an unbroken chain of custody had been established. Users of the records, therefore, could assume that any documents found in the record series had been created and maintained by the Navy until they were transferred to the National Archives. The National Archives then maintained the records as they were received from the Navy. The powerful presumption must be that documents found in the Navy files in the Archives are an accurate reflection of the Navy's files at the time of the transfer. Regardless of the content of the records, the organizational context alone would be enough to argue for their authenticity.

We now know that in the case of the *Constellation*, it was wrong to presume that all of the documents in the Navy files, as they were found in archives, were authentic. Archivists had sought to preserve the records in the context of the office that had created them and they had accessioned a complete series into the archives. Normally, this would be enough to ensure the authenticity of the records. In this case, however, it was also necessary to turn away from the context of creation of the record and to examine the individual record itself.

When Wegner, assisted by forensic document examiners at the FBI, examined the problematic documents, he found a number of elements within the documents that led him to question their authenticity. Since most of the documents were copies, it was not possible to test inks and papers. On the basis of the typeface on some of the documents, however, the FBI could determine that the documents had been typed on typewriters that did not come into existence until 30 years after the documents had supposedly been created. Other documents were

undated and unsigned, raising questions about their authenticity. In yet another instance, the investigators noticed 14 spelling and typographical errors in a simple document. The investigators knew that the office from which this document supposedly originated had strict requirements for accuracy; the suspect document could not have originated in an office that enforced those requirements.

Without realizing it, the investigators had used one of the oldest archival sciences to test the authenticity of the documents: the science of diplomatics. Diplomatics is a body of concepts and methods, originally developed in the seventeenth and eighteenth centuries, «for the purpose of proving the reliability and authenticity of documents.» Over time it has evolved into «a very sophisticated system of ideas about the nature of records, their genesis and composition, their relationships with the actions and persons connected to them, and with their organizational, social, and legal context» (Duranti and Eastwood 1995, quoted in Duranti and MacNeil 1996). Perhaps because diplomatics emerged from the need to understand and authenticate medieval charters, patents, and other legal documents, American archivists knew little about the field until quite recently. In addition, the primary problem facing American archivists for most of this century has not been to understand individual documents but rather to deal with the flood of documents on paper and in other formats generated by a bureaucratic, paper-intensive society.

Fortunately, in 1989 an Italian archivist teaching in Canada introduced North American archivists to the primary concepts of diplomatics through a series of six articles published in the Canadian journal *Archivaria* (Duranti 1998). In these articles and in her later work on reliability and integrity, Duranti expands on the interrelationship between the form, structure, and authorship of documents. The form of a record and the procedure for its creation, she asserts, determine the reliability of the record. A record is more likely to be reliable when its form is complete than when it is incomplete. While documents can require many elements, the two most commonly required elements of form are the date and an element, usually a signature, that assigns responsibility to a person for the content of the record (Duranti 1995).

Diplomatics also provides a mechanism for evaluating the authenticity of copies. Why is an original more reliable as evidence than a copy? It is because the original has the maximum degree of completeness and a higher degree of control in the procedure of creation of the document. Creating a copy always introduces the possibility for variation or change from the original.

On the other hand, there are times when a copy may be more reliable than an original. For example, a contract for the sale of the house that is copied into the deed books of a village government may be more reliable than the original, because a third, impartial, authority can attest to the agreement of the parties represented in the contract. Archives have a long tradition of producing authentic copies, i.e., copies that have not been subject to manipulation, substitution, or falsification after the completion of the process that created the original record. Such copies often entail a change in format (for example, from paper to microfilm) and require that procedures be in place to ensure the authenticity of the resultant copies. If the latter condition is met, archivists willingly discard the originals.

An archivist could use the principles of diplomatics to judge the reliability and the authenticity of the individual documents in the *Constellation* case. For example, questioned documents that lacked a date or a signature would fail the fundamental test for reliability. The document filled with misspellings and typographical errors would also fail. The form of a document that does not follow the documentary conventions of the creating office is suspect; the document itself may be unreliable.

In summary, traditional archival theory has developed two approaches for ensuring the authenticity of the document. The first approach, the basis for most American archives, seeks to understand and control the context in which records are created. Records that are generated in an agency, transferred by law or policy to an archival agency through an unbroken change of custody, and maintained complete and inviolate by that archival agency are presumed to be authentic. The second approach, as exemplified in the works of Duranti, focuses on the individual record: its form and the circumstances of its creation. Together, these two approaches are used to ensure the authenticity of records in the analog world.

Archival Authenticity in a Digital World

The archival profession has established a theoretical base to justify the assertion of authenticity when dealing with analog records. But will the principles that have worked so well in the analog environment transfer to the new digital world? Wendy Duff has noted, 'As records migrate from a stable paper reality to an intangible electronic existence, their physical attributes, vital for establishing the authenticity and reliability of the evidence they contain, are threatened» (Duff 1996). The ease

with which records in electronic form can be created, transferred, and modified only heightens the importance of maintaining their integrity. The central question facing all archivists, therefore, is how to ensure the authenticity of records in digital form. Can the traditional archival methodologies developed for analog records be used for digital records? Or must new methodologies and techniques be developed to ensure that the archival records remain authentic over time?

A number of important initiatives are under way to explore how the integrity of records can be preserved in a digital environment. None of the strategies has yet become widely accepted, primarily because they have not been tested in the field. As Philip Bantin has concluded, «In short, there are no clear-cut answers available yet, but there are plenty of very good ideas and emerging strategies out there» (Bantin 1999). Two of the more promising approaches can be summarized here.

The University of Pittsburgh Functional Requirements for Evidence in Recordkeeping Project

The University of Pittsburgh conducted one of the first and most extensive research projects that sought to identify the functional requirements for the preservation of electronic evidence. Its project, the «Functional Requirements for Evidence in Recordkeeping», consisted of three main components. First, the project identified the functional requirements for recordkeeping in a variety of communities. The project recognized that groups other than archivists (e.g., the legal, medical, and business communities) also had need for authentic, reliable records. Laws, standards, customs, and the best practices of each community contain the justifications for record keeping. To ensure that electronic records meet the needs of those communities (i.e., that they become what the project identified as «business acceptable communications»), one must identify the requirements for recordkeeping in each community and then establish metadata that meet those requirements. The project did this by establishing the recordkeeping requirements and practices of organizations—the literary warrant (Duff 1996; Bearman 1996).

Using the requirements necessary for literary warrant, the project then produced a general specification of the attributes of evidentiality. The specification consists of 13 properties that are categorized into three groups. The first group requires a *conscientious organization* that complies with legal and administrative requirements for recordkeeping. The second group specifies the requirements for *accountable recordkeeping systems*, including policies, assigned responsibility, and for-

mal methodologies for their management and accurate and complete documentation. The Pittsburgh system presupposes that accountable recordkeeping systems are used at all times in the normal course of business. The third group defines the requirements that relate to the *record itself*, specifically how the record is created or captured, how it is maintained, and what is necessary for the record to be used.

In addition to developing the general specification of the requirements for evidentiality, the Pittsburgh project developed a set of production rules to express formally each functional requirement. David Bearman, a consultant on the project, has turned the production rules and general analysis into a set of metadata requirements. The goal is to be able to create records that are encapsulated metadata objects: content in an envelope of metadata that ensures the authenticity, integrity, reliability, and usability of the content.

Implicit in the Pittsburgh approach is the assumption that «recordness» and «evidentiality» (the elements that determine the trustworthiness of records in business and legal settings) can be maintained in an electronic system only if the requisite functionality is built into the record system from the start. Several efforts have been made to implement the Pittsburgh model, most notably in projects under way at Indiana University, a Swedish pharmaceutical company, and the City of Philadelphia, but there is no consensus whether the Pittsburgh project has identified the true functional requirements for authenticity. Some worry that the Pittsburgh model may be too complex, and hence too costly, to implement. Furthermore, it presupposes radical changes in how documents are generated. For example, if one wishes to write a report, one currently opens a word processing package and begins writing. The Pittsburgh system seems to propose that in the future one would open instead a report-writing module. The module would «know» who you are, what your authority for writing the report is, and in what format you are writing the report. The software would automatically encapsulate each draft of the report with this management information. While highly desirable or even mandatory, to ensure the authenticity of the electronic file, such an approach does not reflect how people currently use software.

University of British Columbia Preservation of the Integrity of Electronic Records and InterPARES Projects

Two projects at the University of British Columbia (UBC) are investigating the integrity of digital information over time. The first proj-

ect, «Preservation of the Integrity of Electronic Records», sought to identify the best methods for preserving the reliability and authenticity of electronic records over time. The UBC analysis determined that generic information systems designed to collect, process, store, and disseminate information lack some of the functionality needed to produce, maintain, and preserve reliable electronic records. For example, most current systems do not adequately relate the content of records to business transactions. They also lack sufficient metadata to monitor the creation and maintenance of records in a way that ensures they will be both reliable and understandable when retrieved in the future. The project concluded that reliability and authenticity of electronic records are best ensured when procedural rules for record-keeping are embedded into the overall records system. This finding is similar to that of the Pittsburgh project, which expressed an interest in building into systems the automatic capture of the metadata it has determined are needed to ensure the recordness of the data (Duranti and MacNeil 1996; Hedstrom 1996).

In other ways, however, the UBC project was fundamentally different from the Pittsburgh project (Duranti and MacNeil 1996; Bantini 1999; Marsden 1997). For example, the analysis of the requirements for recordkeeping in the two projects differed greatly. The Pittsburgh project based its analysis on literary warrant, whereas the UBC project's analysis was based on diplomatics and archival theory.

In part because of the difference in starting points, the two projects reached fundamentally different conclusions in some areas. One of the most striking differences relates to the role of the archives in ensuring authenticity. The Pittsburgh project did not assume that an archives is needed to ensure the preservation and authentication of records. In the Pittsburgh system, it is the metadata, not the custodial agency, that determine the authenticity of records. Records can, and in most cases should, remain in the custody of the agency that created them. As one of the Pittsburgh project members has argued, «Archivists cannot afford-politically, professionally, economically, or culturally-to acquire records except as a last resort ... Indeed, the evidence indicates that acquisition of records and the maintenance of the archives as a repository gets in the way of achieving archival objectives and that this dysfunction will increase dramatically with the spread of electronic communications» (Bearman 1991). The UBC project, in contrast, placed archives at the heart of the authentication system for electronic records, in a fashion similar to the role played by archives in protecting and authenticating paper records. This project concluded that «the routine transfer of records to a neutral

third party, that is, to a competent archival body, invested with the exclusive authority and capacity for the indefinite preservation of inactive records, is an essential requirement for ensuring their authenticity over time» (Duranti and MacNeil 1996).

The «Preservation of the Integrity of Electronic Records» project at UBC sought to establish a theoretical framework based in traditional archival principles for the authentication of digital information. A follow-on project is now seeking to put some of these principles into action. The InterPARES (for «International Research on Permanent Authentic Records in Electronic Systems») project is an international collaboration spearheaded by UBC. Its goal is to use the tools of archival science and diplomatics to develop the theoretical and methodological knowledge essential to the permanent preservation of inactive electronically generated records. It will then formulate model strategies, policies, and standards capable of ensuring the preservation of those records. The InterPARES project has generated great interest in the archival community, in part because it is based on familiar principles and practices. The community eagerly awaits reports of its findings.

Conclusion

It is not possible at this early stage to say whether Pittsburgh or UBC has the better approach for ensuring the authenticity of records. Both approaches need to be tested in the field (Bantin 1999). As Margaret Hedstrom has noted, «What we lack is an evaluation of the usefulness of these findings from the perspective of organizations that are responsible in some way for preserving and providing access to electronic records. We need assessments from the administrators of archival and records management programs about the feasibility of putting the proposed policies, and models into practice. We need reactions from people outside the archival community especially where related research and projects are being conducted» (Hedstrom 1996).

In the interim, however, it is easy to speculate that some combination of the Pittsburgh and UBC approaches will come to dominate. The Pittsburgh project's basis in the actual documentary requirements of different communities is very appealing, and the project's desire to include administrative metadata from the very moment of creation is highly desirable.

On the other hand, it is unlikely that all information of interest to future users of records systems will be found in records creation

management systems fully compliant with the Pittsburgh metadata. Scholars will be willing to access, use, and evaluate the information found in the electronic files, regardless of whether the actual data convey the true quality of «recordness». An archival purist might insist that if information is not stored in a record keeping system, then the information cannot be a record and therefore should not be part of the archival record. In reality, however, our repositories are filled with interesting information that may not meet the formal definition of «record» or may not have been created with a record keeping system in mind.

A good example of how material that is not formally a record can be valuable to the researcher is the famed PROFS case (Bearman 1993). PROFS refers to a proprietary IBM communication system used in the White House under Presidents Ford and Reagan. Because they were system back-up tapes, the PROFS tapes lacked even the rudiments of record keeping functionality. Nevertheless, a consortium of historical groups sued for the release of the tapes. In the absence of controlled records, the information on the back-up tapes was the best the researchers could find. For researchers, the value of the tapes was great because they were still held by the agency and were surprisingly complete. However, even if only selections of the e-mail messages had survived and were located only in nongovernmental repositories, researchers would still try to use them, even though their authenticity was more questionable.

In short, social mechanisms of control promise to be the fundamental basis for the establishment of digital authenticity. It would be desirable if all digital information consisted of true records created in a system that encapsulates with the record the information needed to maintain the evidential value of the records. For most digital information, however, the fact that it is in an archives, an unbiased third party, will have to suffice. As with the paper records used in the *Constellation* example, the fact that digital information is found within a trusted repository may become the base upon which all further assessments of authenticity build.

Even if the physical presence of digital data in a trusted repository is the basis for future assessments of authenticity, archivists will still need to associate with those digital documents metadata that researchers can use to understand and assess digital information. We need self-conscious documentation by the creators and preservers of digital representations that details the methods employed in making and maintaining the representations. We also need to know what researchers need to know about the transformation from analog to digital format, as

well as about any transformations that may occur as digital data are preserved. To determine the latter, we need to understand the «digital literacy» that future researchers will need «to assess digital information, identify known artifacts introduced by particular processes, and correctly identify as yet unknown sources of distortion» (Bearman and Trant 1998). Only by understanding the interactions between researcher and document and records and repositories will we be able to convey into the future the trust mechanisms of the paper world.

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